38. The process of claim 36, wherein the intermediate layer is .5 to 10 microns thick.

39. The process of claim 36, wherein the intermediate layer is formed with a copper oxide layer having a thickness of 1.5×10^{-4} to 1200×10^{-4} microns.

40. The process of claim 36, wherein the intermediate layer is formed by:

applying a uniform copper layer by sputtering to at least one side of the aluminum nitride ceramic;

heating the substrate in a atmosphere containing N_2 and O_2 in a 20:80 proportion to a temperature of 1280°C;

maintaining the temperature of 1280°C for 30 minutes; and

cooling to room temperature.

41. The process of claim 36, further comprising the step of applying a layer of aluminum oxide onto the intermediate layer.

42. The process of claim 36, further comprising the step of applying a metal layer onto the intermediate layer.

43. The process of claim 42, further comprising the step of applying a layer comprising a copper and/or a copper oxide between the intermediate layer and the metal layer.

44. The process of claim 36, wherein the copper oxide is uniformly distributed in clusters.

45. The process of claim 44, wherein the clusters have a diameter of less than 0.01 microns.

46. The process of claim 36, wherein the concentration of copper oxide in said intermediate layer decreases with increasing distance from the layer of aluminum nitride ceramic.--

REMARKS

The applicants have substituted new claims to avoid the objections made by the Examiner or the rejections by the Examiner under 35 USC 112, second paragraph. The Examiner also rejected the claims under 35 U.S.C. 103(a) as being unpatentable over Arledge et al (5,382,471 or 5,217,589) and Pack et al (5,418,002) alone.

The Examiner is correct in saying that the cited references teach a process including applying an aluminum oxide intermediate layer on aluminum nitride substrate. The Examiner is incorrect when he states that these teach the claimed process. As is mentioned in the Background of the Invention, the use of an aluminum oxide layer on an aluminum nitride substrate for purposes of applying a copper layer is known in the art. The process of applying copper to a substrate has caused cracks and leaks in the intermediate layer. These cracks and leaks allow a heavy chemical reaction between the aluminum nitride and copper oxide layer to occur. The chemical reaction produces nitrogen gas and causes bubbles between the ceramic and the copper foil. This is precisely the deficiency applicants address in their novel process.

The invention uses a copper oxide and aluminum oxide in an intermediate layer. This avoid any cracks or leaks in the intermediate layer and prevents any chemical reaction between the copper oxide of the foil that is bonded to the substrate. This limitation was present in claim 18, line 5-6 and 8. Claim 18 clearly recited that the intermediate layer contained 0.05 to 44% by weight of copper oxide. This novel combination of components in the intermediate layer is now present in the claims of record and therefore the claims presently in the case are allowable. Such action is eagerly and earnestly solicited.